

CANOBEAM DT-150 HD

Wireless Free Space Optics Transmission

CHALLENGE # 1

Sports Network Needs to Relay Telephoto HD Point-of-View Shot From Remote Vantage Point

Positioned on a hillside a quarter-mile away, a Canon DIGISUPER100xs HD telephoto lens on an HD camera captures a live panoramic beauty shot of a major college stadium, complete with a cheering crowd surrounding the location studio hosts. But how does the broadcaster relay that dramatic HD video back to their TV truck?

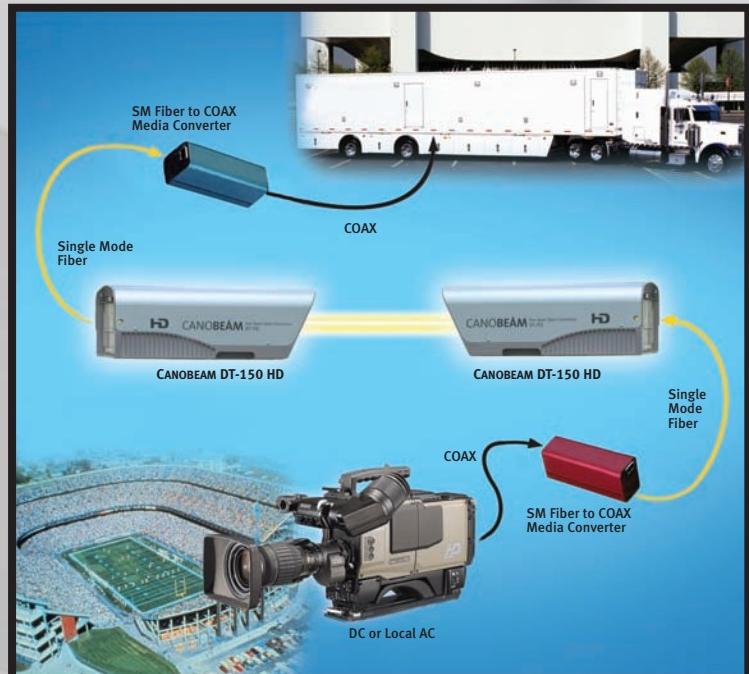
SOLUTION

The Canobeam DT-150 HD

Using Free Space Optics, the Canobeam DT-150 HD delivers live, uncompressed HD-SDI video from a maximum recommended transmission distance of approximately 1 kilometer (3,168 ft.). Canobeam DT-150 HD advantages include:

- Quick set-up/quick tear-down.
- No need to install quarter-mile HD fiber cable.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.

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Using media converters, the broadcaster converted the HD-SDI signal from the HD camera to single-mode fiber-optic cable, which interfaced directly to a Canobeam DT-150 HD. The HD-SDI signal was received by a second Canobeam DT-150 HD, relayed via single-mode fiber and converted back to coaxial cable via a media converter, and then received by the HD broadcast truck.

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CHALLENGE-SOLUTION EQUIPMENT LIST:

- HDTV Camera with an HD-SDI output
- Canon Canobeam DT-150 HD Link / One Pair
- Stratos Video BNC to ST Media Converter or Telecast Rattler - Mini HD-SDI Link / One Pair
- Appropriate length of Coax Cable / Two
- Appropriate length of Single Mode Fiber / Two

Transmission Distances at Varying Degrees of Atmospheric Attenuation

Weather	Light Haze
Precipitation²	Light Rain @ 2.5mm/hr
Attenuation/km	3dB
Visibility³	4333m
DT-150 Transmission Distance³	3650m
Weather Condition¹	Thin Fog
Precipitation²	Heavy Rain @ 25mm/hr
Attenuation/km	10dB
Visibility³	1300m
DT-150 Transmission Distance³	1720m
Weather Condition¹	Light Fog
Precipitation²	Cloudburst @100 mm/hr
Attenuation/km	30dB
Visibility³	433m
DT-150 Transmission Distance³	780m

S P E C I F I C A T I O N S

Applications	HD-SDI/SD-SDI/DVB-ASI
Standard Transmission Distance (*1)	20-1000m
Data Transmission Speed	1.485Gbps 1.485/1.001Gbps, 270Mbps (*2)
Transmission Device	Laser Diode
Laser Wavelength	785±15nm
Laser Output Power	Approx. 11mW
Safety Class of Laser	Class 1M
Receiving Device	Si APD
Auto Tracking Adjustment	Horizontal: ±1.2° Vertical: ±1.2°
3R Function	Yes
Media Interface	SFP SLOT x1
Console Port	RS-232C(DSUB-9Pin), 10Base-T(RJ-45)
Operation Temperature Range	-20°C~+50°C
Power	100-240VAC 50/60Hz (DC-48V optional)
Power Consumption	Approx. 20W
Installation Environment	Indoor or outdoor (Weatherproof : IP56)
Dimensions	246(W) x 168(H) x 487(D)mm
Weight	Approx. 17.6 lbs (8Kg)

Visibility distances are approximate.

Above values are calculated by transmission margin, beam divergence, Gaussian intensity distribution of light.

Actual transmission distance should be considered with scintillation, backlight noise, and other factors.

1. E.J. McCartney, Optics of the Atmosphere, J. Wiley & Sons, New York, 1976

2. T.S. Chu and D.C. Hogg, Effects of precipitation on propagation at 0.63, 3.5, and 10.6 Microns, Bell Syst. Tech. J., 47, pp. 723-759, 1968.

3. All distances expressed in meters.

Above values are different from Canon recommended transmission distances described in specifications.

(*1) Above values are calculated under conditions of more than 99.5% reliability based on actual visibility data in Tokyo, Japan. Longer transmission distances can be achieved but this is a function of weather conditions and acceptable link availability

(*2) This model is not compliant with SDI Check Field Signals (pathological signals)

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CHALLENGE # 2

Cable Network HQ Requires Permanent Bidirectional HD Link to its Production Facility

Executives at the headquarters of a major cable network had no direct satellite or fiber connection with their production studios in a neighboring state. Neither location could send the other instant bidirectional HD video with embedded audio, which was essential to their operations.

SOLUTION

The Canobeam DT-150 HD

Fortunately, the cable network's headquarters did have direct line of sight to a nearby building with access to either satellite connectivity or long-haul fiber. A permanent installation of a pair of Canobeam DT-150 HD's—one on the roof of the building housing the cable network and a second unit on the roof of the building with satellite/fiber connectivity—established the reliable bidirectional HD-SDI video link (with embedded audio) that the network required.

- Maximum recommended transmission distance: approximately 1 kilometer (3,168 ft.).
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.

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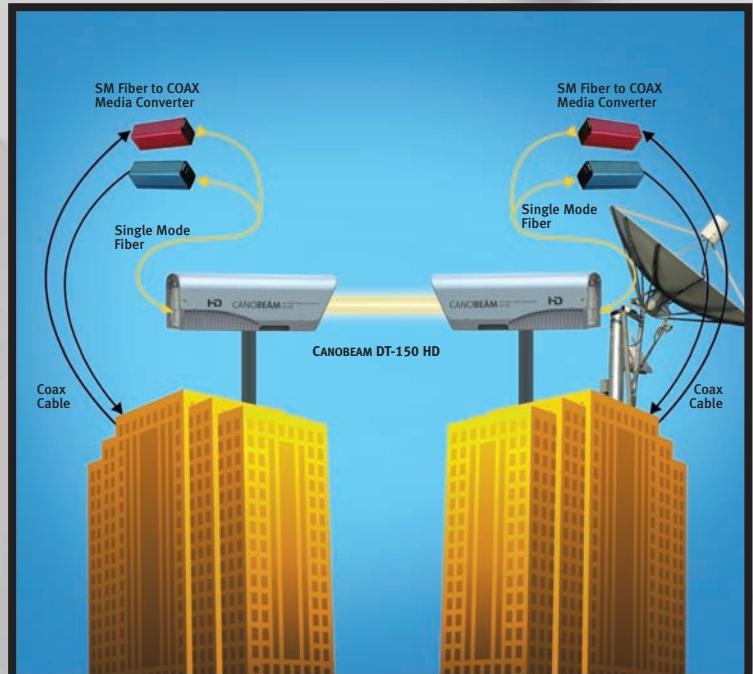
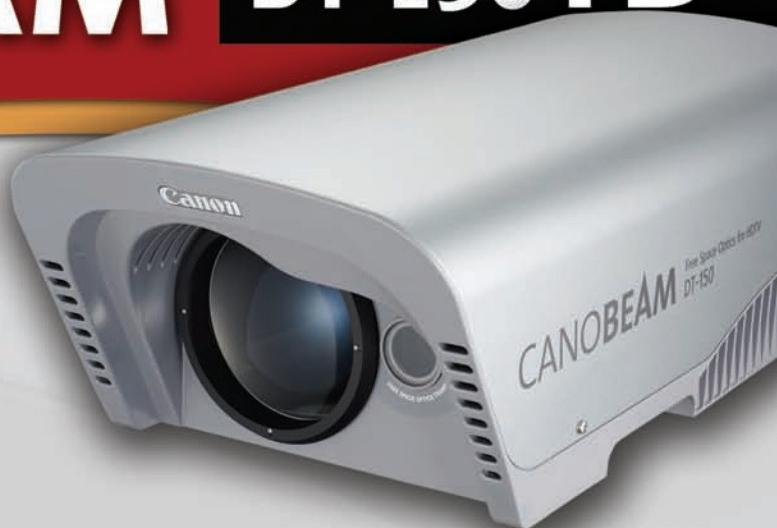


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Using media converters, the cable network converts its HD-SDI video to travel on single-mode fiber-optic cable, which interfaces directly to the Canobeam DT-150 HD permanently mounted on their roof. This HD-SDI signal is then received by the Canobeam DT-150 HD on the neighboring office building and relayed via single-mode fiber to a second media converter, which interfaces with a coaxial cable feeding the fiber connection. The result is a two-way bidirectional HD-SDI video link (with embedded audio).

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Wireless Free Space Optics Transmission



CHALLENGE-SOLUTION EQUIPMENT LIST:

- HD-SDI bidirectional signals
- Canon Canobeam DT-150 HD Link / One Pair
- Stratos Video BNC to ST Media Converter or Telecast Rattler - Mini HD-SDI Link / Two Pair
- Appropriate length of Coax Cable / Four
- Appropriate length of Single Mode Fiber / Two

Transmission Distances at Varying Degrees of Atmospheric Attenuation

Weather	Light Haze
Precipitation²	Light Rain @ 2.5mm/hr
Attenuation/km	3dB
Visibility³	4333m
DT-150 Transmission Distance³	3650m
Weather Condition¹	Thin Fog
Precipitation²	Heavy Rain @ 25mm/hr
Attenuation/km	10dB
Visibility³	1300m
DT-150 Transmission Distance³	1720m
Weather Condition¹	Light Fog
Precipitation²	Cloudburst @100 mm/hr
Attenuation/km	30dB
Visibility³	433m
DT-150 Transmission Distance³	780m

S P E C I F I C A T I O N S

Applications	HD-SDI/SD-SDI/DVB-ASI
Standard Transmission Distance (*1)	20-1000m
Data Transmission Speed	1.485Gbps 1.485/1.001Gbps, 270Mbps (*2)
Transmission Device	Laser Diode
Laser Wavelength	785±15nm
Laser Output Power	Approx. 11mW
Safety Class of Laser	Class 1M
Receiving Device	Si APD
Auto Tracking Adjustment	Horizontal: ±1.2° Vertical: ±1.2°
3R Function	Yes
Media Interface	SFP SLOT x1
Console Port	RS-232C(DSUB-9Pin), 10Base-T(RJ-45)
Operation Temperature Range	-20°C~+50°C
Power	100-240VAC 50/60Hz (DC-48V optional)
Power Consumption	Approx. 20W
Installation Environment	Indoor or outdoor (Weatherproof : IP56)
Dimensions	246(W) x 168(H) x 487(D)mm
Weight	Approx. 17.6 lbs (8Kg)

Visibility distances are approximate.

Above values are calculated by transmission margin, beam divergence, Gaussian intensity distribution of light.

Actual transmission distance should be considered with scintillation, backlight noise, and other factors.

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2. T.S. Chu and D.C. Hogg, Effects of precipitation on propagation at 0.63, 3.5, and 10.6 Microns, Bell Syst. Tech. J., 47, pp. 723-759, 1968.

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CANOBEAM DT-150 HD

Wireless Free Space Optics Transmission

CHALLENGE # 3

HD News Crew Needs to Relay Video of Manhattan Street Demonstration Back to Washington DC TV Station

A spontaneous political demonstration in midtown Manhattan left no time for a news crew to make a costly long-haul fiber connection back to Washington DC or to establish an HD microwave relay to the roof of a nearby TV station with satellite connectivity. How, then, could the crew get live video of this important news event back to the Washington DC TV station?

SOLUTION

The Canobeam DT-150 HD

Inexpensive enough for news operations, the Canobeam DT-150 HD sets up quickly to establish a temporary line-of-sight HD connection. The news crew used a Canobeam DT-150 HD to link their ENG van to a second Canobeam on the roof of a nearby TV station with satellite connectivity. This provided the crew with a quick and easy way to relay live HD video of the demonstration back to Washington DC.

- Maximum recommended transmission distance: approximately 1 kilometer (3,168 ft.).
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.
- No frequency interference, coordination, or licensing necessary with Free Space Optics



*Telecast SHED located at satellite dish antenna. **Telecast SHED/HDX located in the news van.

By using Telecast Fiber Systems' SHED (SMPTE Hybrid Elimination Device) or similar technology on either end of the connection, a pair of Canobeam DT-150 HD units provided bidirectional HD-SDI video with embedded audio to a nearby New York TV station, which then transmitted the video via a simple satellite link to a second TV station in Washington DC.

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Wireless Free Space Optics Transmission



CHALLENGE-SOLUTION EQUIPMENT LIST:

- HDTV Camera (SMPTE Hybrid Fiber Cable output) and CCU
- Canon Canobeam DT-150 HD Link / One Pair
- Telecast SHED - SMPTE Hybrid Elimination Device / One
- Telecast SHED HDX - SMPTE Hybrid Elimination Device / One
- Appropriate length of SMPTE Hybrid Cable / Two
- Appropriate length of Single Mode Fiber / Two

Transmission Distances at Varying Degrees of Atmospheric Attenuation

Weather	Light Haze
Precipitation²	Light Rain @ 2.5mm/hr
Attenuation/km	3dB
Visibility³	4333m
DT-150 Transmission Distance³	3650m
Weather Condition¹	Thin Fog
Precipitation²	Heavy Rain @ 25mm/hr
Attenuation/km	10dB
Visibility³	1300m
DT-150 Transmission Distance³	1720m
Weather Condition¹	Light Fog
Precipitation²	Cloudburst @100 mm/hr
Attenuation/km	30dB
Visibility³	433m
DT-150 Transmission Distance³	780m

S P E C I F I C A T I O N S

Applications	HD-SDI/SD-SDI/DVB-ASI
Standard Transmission Distance (*1)	20-1000m
Data Transmission Speed	1.485Gbps 1.485/1.001Gbps, 270Mbps (*2)
Transmission Device	Laser Diode
Laser Wavelength	785±15nm
Laser Output Power	Approx. 11mW
Safety Class of Laser	Class 1M
Receiving Device	Si APD
Auto Tracking Adjustment	Horizontal: ±1.2° Vertical: ±1.2°
3R Function	Yes
Media Interface	SFP SLOT x1
Console Port	RS-232C(DSUB-9Pin), 10Base-T(RJ-45)
Operation Temperature Range	-20°C~+50°C
Power	100-240VAC 50/60Hz (DC-48V optional)
Power Consumption	Approx. 20W
Installation Environment	Indoor or outdoor (Weatherproof : IP56)
Dimensions	246(W) x 168(H) x 487(D)mm
Weight	Approx. 17.6 lbs (8Kg)

Visibility distances are approximate.

Above values are calculated by transmission margin, beam divergence, Gaussian intensity distribution of light.

Actual transmission distance should be considered with scintillation, backlight noise, and other factors.

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CHALLENGE # 4

Major Live Entertainment Event Needs Bi-Directional HD Alternative to 1500 ft. Fiber Cable

Atop a building in the heart of the city, HD cameras outfitted with a Canon portable HD zoom lens and a Canon DIGISUPER 100xs HD telephoto lens provide live coverage of celebrities entering a major entertainment venue. Meanwhile, 1,500 ft. away, a mobile HDTV control room is set up to switch the event. HD-SDI video with embedded audio, bidirectional camera control, return video, tallies, and IFB are a must, but it's too far to run a heavy SMPTE hybrid fiber cable or single-mode fiber cable along city streets.

SOLUTION

The Canobeam DT-150 HD

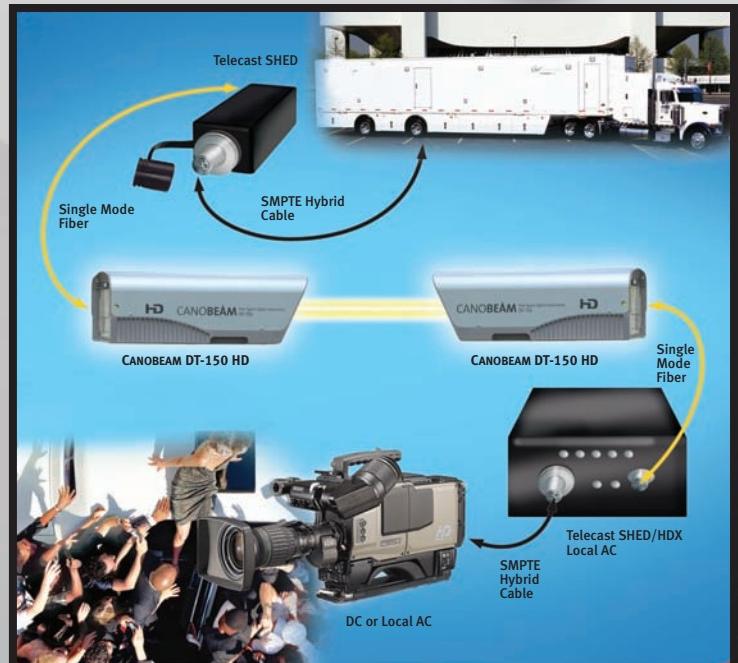
A Canobeam DT-150 HD positioned next to the rooftop HD cameras used line-of-sight Free Space Optics to establish a secure bidirectional HD-SDI connection with a second

Canobeam DT-150 HD mounted above the production truck parked 1,500 ft. away. The two Canobeam DT-150 HD units and additional hardware (see box at right) provided HD-SDI video with embedded audio, bidirectional camera control, return video, tallies, and IFB to and from the HDTV truck.

- Maximum recommended transmission distance: approximately 1 kilometer (3,168 ft.).
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from camera platforms, street traffic, or wind conditions.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.

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By using Telecast Fiber Systems' SHED (SMPTE Hybrid Elimination Device) or similar technology on either end of the connection, a pair of Canobeam DT-150 HD units can provide not only bidirectional HD-SDI video with embedded audio, but also bidirectional camera control signals, return video, tallies, and IFB.

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CANOBEAM DT-150 HD

Wireless Free Space Optics Transmission



CHALLENGE-SOLUTION EQUIPMENT LIST:

- HDTV Camera (SMPTE Hybrid Fiber Cable output) and CCU
- Canon Canobeam DT-150 HD Link / One Pair
- Telecast SHED - SMPTE Hybrid Elimination Device / One
- Telecast SHED HDX - SMPTE Hybrid Elimination Device / One
- Appropriate length of SMPTE Hybrid Cable / Two
- Appropriate length of Single Mode Fiber / Two

Transmission Distances at Varying Degrees of Atmospheric Attenuation

Weather	Light Haze
Precipitation²	Light Rain @ 2.5mm/hr
Attenuation/km	3dB
Visibility³	4333m
DT-150 Transmission Distance³	3650m
Weather Condition¹	Thin Fog
Precipitation²	Heavy Rain @ 25mm/hr
Attenuation/km	10dB
Visibility³	1300m
DT-150 Transmission Distance³	1720m
Weather Condition¹	Light Fog
Precipitation²	Cloudburst @100 mm/hr
Attenuation/km	30dB
Visibility³	433m
DT-150 Transmission Distance³	780m

S P E C I F I C A T I O N S

Applications	HD-SDI/SD-SDI/DVB-ASI
Standard Transmission Distance (*1)	20-1000m
Data Transmission Speed	1.485Gbps 1.485/1.001Gbps, 270Mbps (*2)
Transmission Device	Laser Diode
Laser Wavelength	785±15nm
Laser Output Power	Approx. 11mW
Safety Class of Laser	Class 1M
Receiving Device	Si APD
Auto Tracking Adjustment	Horizontal: ±1.2° Vertical: ±1.2°
3R Function	Yes
Media Interface	SFP SLOT x1
Console Port	RS-232C(DSUB-9Pin), 10Base-T(RJ-45)
Operation Temperature Range	-20°C~+50°C
Power	100-240VAC 50/60Hz (DC-48V optional)
Power Consumption	Approx. 20W
Installation Environment	Indoor or outdoor (Weatherproof : IP56)
Dimensions	246(W) x 168(H) x 487(D)mm
Weight	Approx. 17.6 lbs (8Kg)

Visibility distances are approximate.

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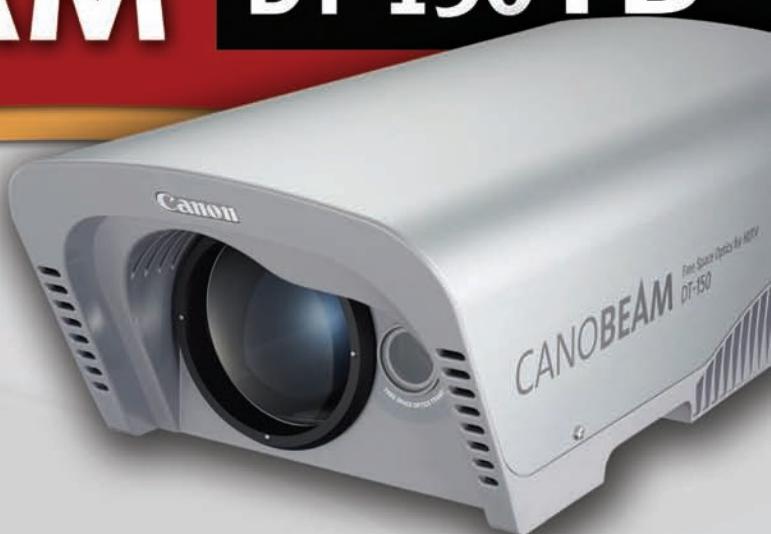
DT-150 HD

Wireless Free Space Optics Transmission

CHALLENGE # 5

Major Broadcast Network Needs to Transmit Control Signals to Robotic PTZ Camera Mounted on the Side of a Skyscraper

A robotic PTZ (pan/tilt/zoom) camera is mounted 20 floors up on the side of a landmark office building to



capture panoramic shots of a world-famous ice-skating rink. It's the perfect vantage point, but how can the TV network transmit control signals to the PTZ camera while simultaneously receiving the camera's HD-SDI video output?

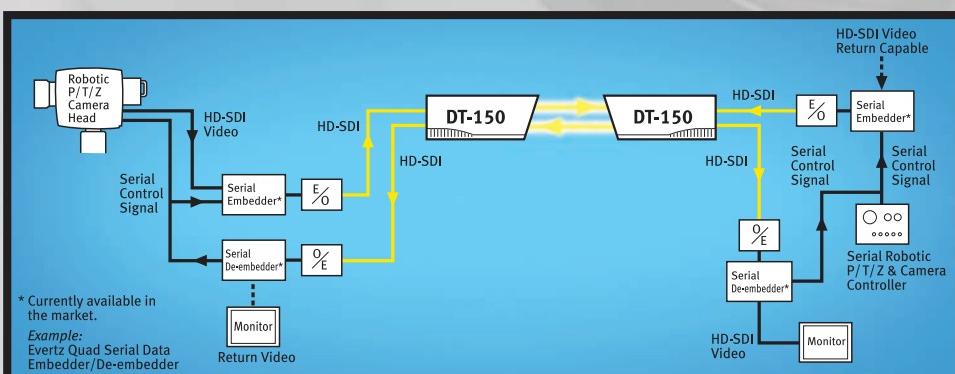
SOLUTION

The Canobeam DT-150 HD

Rather than running bulky and expensive SMPTE hybrid fiber cable or single-mode fiber cable up to the 20th floor, a far better solution is the convenience and reliability of Canon's Canobeam DT-150 HD bidirectional wireless Free Space Optics technology. The Canobeam DT-150 HD enables the TV network to capture bird's-eye point-of-view shots of a world-famous tourist destination in HDTV while simultaneously controlling the pan, tilt, and zoom functions

of their sky-high robotic camera (which is outfitted with a Canon HD telephoto lens).

- Maximum recommended transmission distance: approximately 1 kilometer (3,168 ft.).
- Exclusive Canon Auto Tracking maintains beam alignment despite vibrations from street traffic or wind conditions.
- No frequency interference, coordination, or licensing necessary with Free Space Optics.



Using technology such as Evertz's Quad Serial Data Embedders and De-Embedders and a pair of Canobeam DT-150 HD video transceivers, the network is able to transmit HD-SDI video signals from the PTZ camera to their control room while simultaneously transmitting the required control signals back to the robotic PTZ head and its camera.

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DT-150 HD

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CHALLENGE-SOLUTION EQUIPMENT LIST:

- Robotic P/T/Z Camera with HD-SDI Video and Serial Data Control
- Robotic P/T/Z Controller (Serial Data)
- Canon Canobeam DT-150 HD Link / One Pair
- Evertz Quad Serial Data Embedder / Two
- Evertz Quad Serial Data De-embedder / Two
- Electrical/Optical (E/O) Converter / Two
- Optical/Electrical (O/E) Converter / Two
- HD-SDI Video Monitor / Two
- Appropriate length of Coax Cable / Three
- Appropriate length of Single Mode Fiber / Two
- Appropriate length of Serial Digital Cables / As Needed

Transmission Distances at Varying Degrees of Atmospheric Attenuation

Weather	Light Haze
Precipitation ²	Light Rain @ 2.5mm/hr
Attenuation/km	3dB
Visibility ³	4333m
DT-150 Transmission Distance ³	3650m
Weather Condition ¹	Thin Fog
Precipitation ²	Heavy Rain @ 25mm/hr
Attenuation/km	10dB
Visibility ³	1300m
DT-150 Transmission Distance ³	1720m
Weather Condition ¹	Light Fog
Precipitation ²	Cloudburst @100 mm/hr
Attenuation/km	30dB
Visibility ³	433m
DT-150 Transmission Distance ³	780m

Visibility distances are approximate.

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S P E C I F I C A T I O N S

Applications	HD-SDI/SD-SDI/DVB-ASI
Standard Transmission Distance (*1)	20-1000m
Data Transmission Speed	1.485Gbps 1.485/1.001Gbps, 270Mbps (*2)
Transmission Device	Laser Diode
Laser Wavelength	785±15nm
Laser Output Power	Approx. 11mW
Safety Class of Laser	Class 1M
Receiving Device	Si APD
Auto Tracking Adjustment	Horizontal: ±1.2° Vertical: ±1.2°
3R Function	Yes
Media Interface	SFP SLOT x1
Console Port	RS-232C(DSUB-9Pin), 10Base-T(RJ-45)
Operation Temperature Range	-20°C~+50°C
Power	100-240VAC 50/60Hz (DC-48V optional)
Power Consumption	Approx. 20W
Installation Environment	Indoor or outdoor (Weatherproof : IP56)
Dimensions	246(W) x 168(H) x 487(D)mm
Weight	Approx. 17.6 lbs (8Kg)

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